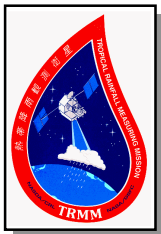# TRMM Flight Operations Monthly Status Review (MSR)

January 3rd, 2001

# FOT Overview

- Operations Status
  - Flight Ops Summary - Lou Kurzmiller
  - Electrical & Thermal - Andy Calloway
  - ACS & FDS / C&DH - Mark Fioravanti
  - RCS & RF / Comm - David Corley
  - Power & Deployables - Justin Knavel
  - LIS - Justin Knavel
  - CERES & VIRS - Mark Fioravanti
  - TMI - David Corley
  - PR - Andy Calloway
  - Ground System - Dan Palya
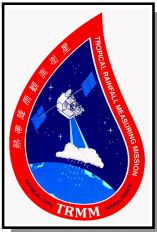  - Upcoming Activities - Andy Calloway
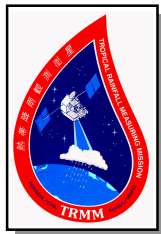
# **Flight Operations Summary**

- Supported 552 SN events in December

  - 2 Yaw Maneuvers

  - 9 Delta-V Maneuvers

- 1 Event & 1 Anomaly Rpt; 6 Generic Late Acq Rpts generated

  - ER #222 MOC H/w: LTS Bed 4 power supply failure

  - AR # 85: Solar Array cmded/sensed position spike
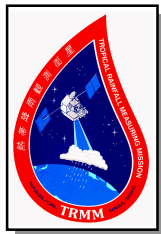
# **Flight Operations Summary**

- Notable Events

    - Vickie Moran is TRMM Mission Director

    - CERES instrument powered on

    - VIRS Solar Cal Door anomaly corrected

    - Working to establish test/training facility in B-14

    - Development of TRMM Flight Operations website

    - Successfully completed the primary term of Mission Operations

# Flight Ops Summary

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTALS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPECIAL SPACECRAFT EVENTS AND ACTIVITIES FOR TRMM 2000 | | | | | | | | | | | | |
| 2 | 6 | 8 | 10 | 13 | 9 | 7 | 9 | 8 | 8 | 12 | 12 | 9 | 111 |
| 2a | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 2 | 16 |
| 2b | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2c | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 2 | 1 | 0 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 15 |
| 3a | 5 | 1 | 3 | 7 | 4 | 4 | 2 | 4 | 6 | 9 | 6 | 3 | 54 |
| 3b | 3 | 1 | 2 | 4 | 4 | 3 | 3 | 6 | 3 | 3 | 5 | 1 | 38 |
| 3c | 0 | 3 | 2 | 2 | 0 | 0 | 2 | 0 | 2 | 2 | 2 | 1 | 16 |
| 3d | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 4 |
| 3e | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 44 | 0 | 0 | 0 | 44 |
| 3f | 6 | 1 | 3 | 3 | 5 | 2 | 2 | 4 | 3 | 1 | 1 | 6 | 37 |
| 4 | 3 | 3 | 0 | 3 | 3 | 5 | 0 | 2 | 1 | 1 | 3 | 0 | 24 |
| 4a | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 3 | 27 |
| 4b | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 18 |
| 4c | 0 | 7 | 21 | 23 | 10 | 19 | 12 | 3 | 1 | 0 | 0 | 1 | 97 |
| 4d | 11 | 0 | 4 | 1 | 4 | 2 | 4 | 1 | 2 | 4 | 2 | 0 | 35 |
| 4e | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 |
| 5 | 3 | 3 | 2 | 3 | 0 | 0 | 2 | 1 | 2 | 4 | 1 | 2 | 23 |
| 5a | 0 | 0 | 4 | 0 | 1 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 11 |
| 5b | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5c | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 0 | 23 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOT: | 44 | 33 | 58 | 64 | 47 | 52 | 45 | 36 | 78 | 44 | 62 | 33 | 596 |

## LEGEND

| CSOC CATEGORIES | | TRMM-SPECIFIC SUB-CATEGORIES AND EXAMPLES |
|---|---|---|
| 1 | Targets of Opportunity | N/A |
| 2 | S/C Maneuvers | DeltaVs **(2)** , 180° Yaw Maneuvers **(2a)** , 90° Yaws **(2b)** , Deep Space Cals **(2c)** |
| 3 | Unplanned Events | Blind Acqs **(3)** , Patch Loads **(3a)** , Manual DS Ops - Blind Acqs, MI, etc. **(3b)** , EPV Fails **(3c)** , VIRS Reset Ops **(3d)** , Anomaly Recoveries **(3e)** , Generic Late Acqs - GCMRs / DS Ops **(3f)** |
| 4 | Customer Requests | PR **(4)** , VIRS **(4a)** , LIS **(4b)** , CERES **(4c)** , FSW **(4d)** , AETD **(4e)** |
| 5 | Celestial Phenomena | UTCF / FS Ops **(5)** , Power Ops - Autospru, TSMs, C/D **(5a)** , Xpdr Offset Ops **(5b)** , Leonids **(5c)** |
| 6 | Pre-Launch Testing | N/A |
| 7 | L&IOC Operations | N/A |
| 8 | EOL Operations | Delta-H Firings **(8)** , Reentry Maneuvers **(8a)** |
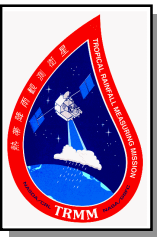
# Thermal / Electrical Subsystems

- Thermal and Electrical subsystems remain nominal with no open issues

- FOT will assist AETD as needed for End Of Life Thermal Analysis

  - Kim Brown has been contacted to start looking into the following analysis:

    » What is lowest attainable perigee which still meets thermal survivability constraints

    » What are the thermal constraints, if any, of long duration burns with respect to non-thruster spacecraft components

- No relay or other Electrical issues at this time

  - No unusual affects from CERES turn-on were experienced
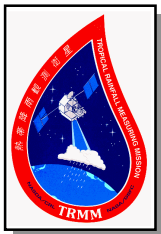
# ACS Subsystem

- Open CCRs (In order of Priority);

  - CCR #069: New table 85 to match new TDRS-8 continuity limits for other TDRS, and another table 85 to widen the limits after an update failure.

  - CCR #070: New version of Table 61 to incrementally pitch the S/C while in Sun Acq, if Solar Array fails.

  - CCR #005: Correction for Magnetic Field Epoch, will be required for EOL if apogee is greater than 400 km.

  - CCR #065: Update ACS system tables in preparation for EOL activities.

    » Table #73 (Thruster Parameters)

    » Table #90 (Mode Configuration Data for Contingency)

  - CCR #053: ACS FS/W bug
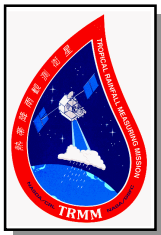
# FDS/C&DH Subsystems

- UTCF Status;

  - Two Adjustments were performed: one on 00-349 (Thursday, December 14th, 2000), and the second on 00-362 (Wednesday, December 27th, 2000)

  - Current UTCF value is 31535996.832828 sec

- Open CCRs;

  - CCR #034: Writing from RAM to EEPROM for new TSM table #21 and RTSs # 2, 3, 13, 14, and 15.  Completed, only need final documentation.

  - CCR #047: Will work with FSW on no-clock software patch activities

  - CCR #048: New on-board DS filter table to record ACE 8-Hz data

  - CCR #071: Build a new DS quota table (73) to reallocate CERES science memory to other instruments, contingent on powering CERES off permanently.
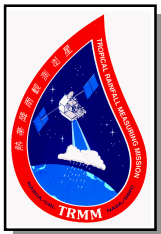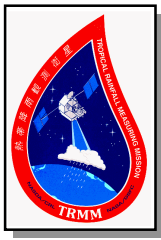
# RCS Subsystem

- RCS performed 9 successful Delta-V maneuvers (#255 - #263)

- EOL estimate remains **September, 2003** pending new EOL scenarios.

  - Current fuel remaining is 476.782 kg

- No Open RCS Anomaly or Event Reports

- Upcoming Events

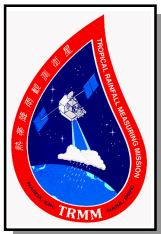  - Begin review of, and training in, Delta-H procedures and scripts for EOL
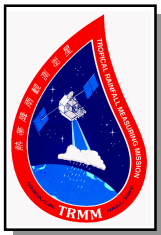
# RF Subsystem

- 6 Generic Late Acquisitions (#74-79)

  – 337/1657z TDS event:  Locked up @ 165819.  One fwd reacq was sent. All data recovered.

  – 343/2026z  T171 event:  Locked up @ 202806.  One fwd reacq was sent. Event dump and VR playback was performed.  All data recovered.

  – 349/1938z TDW event:  Locked up @ 193954.  One fwd reacq was sent. All data recovered..

  – 354/164830z TDW event:  Locked up @165009.  One fwd reacq was sent..  All data recovered.

  – 362/1330z TDW event:  Locked up @ 133203.  One fwd reacq was sent. All data recovered.

  – 366/221730z TDE event:  Locked up @ 221858.  One fwd reacq was sent. All data recovered.
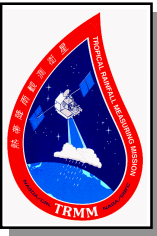
# RF Subsystem

- Frequency offsets (monthly average)

  – Transponder #1 = +691.476 Hz

  – Transponder #2 = -807.178 Hz

- No RF Event Reports or MOCRS this month

- Upcoming Events

  – Offset of transponder frequencies likely within 4 months

# Power Subsystem

- 00-347(December 12th) - New TSM Table 21 was uplinked with the Differential Voltage TSMs 37-40.  Then, TSMs 37-40 were enabled.

  - All Power RTSs and TSMs are enabled.

- No change in PSIB A or B telemetry.

- The new pseudo mnemonics for Essential Bus Voltage and Non-Essential Bus Current are now being trended.

- No other open issues.

# **Deployables Subsystem**

- Anomaly #85 - Solar Array Commanded & Sensed Position Spike

  – 01-001(January 1st) at 03:03z, ATS TSM 7 tripped , because the  -Y array commanded position and sensed position difference was greater than 0.51° for 2 minutes.

  – As the solar arrays were slewing to the feathered position (0°) for eclipse, there was a one-sample spike in the commanded and sensed position of both arrays:  -Y array (Commanded = 66.262° and Sensed =-0.0005°) and +Y array (Commanded = 68.0695° and Sensed = -177.826°).  At the time of the spike, the arrays were almost to the feather position, at about 2.4°.

  – When the sensed position is within 0.51° of the commanded position, the command velocity drops out of slew mode to the minimum of 1 pps.  When the -Y array sensed position spiked to -0.0005, it was within 0.51° of the previous commanded position and the commanded velocity dropped to 1 pps.  It therefore took longer than 2 minutes for the -Y array to go from 2.4° to 0° at
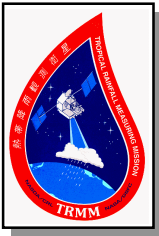
# Deployables Subsystem

1pps, so ATS TSM 7 failed and triggered an event message.

– The -Y array did plateau at 2.3995° for 8 seconds after the commanded velocity first dropped to 1 pps (Reason Unknown).

» Trending and Gyro data may help answer this question.

• No open issues other than to concentrate on array behavior and contingency training with all FOT members.
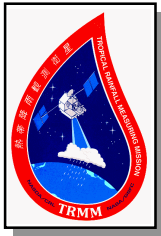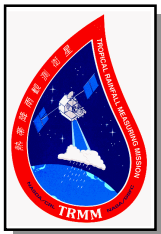
# LIS Instrument

- Routine MSFC real-time command request performed on 00-346 and 00-363 (December 11th and 28th) to reduce packet sequence errors
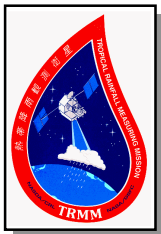
- No open issues
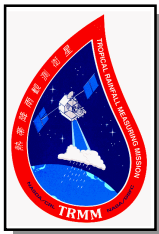
# CERES Instrument

- Powered On, on 00-349 (Thursday, December 14th, 2000)

  - Remains in the same status as it was previous to the Loadshed Anomaly (i.e. no Science collection because of DAP failure)

  - LaRC may wish to perform gimbal tests and then power Off the instrument.

- Open Issues

  - Data Acquisition Processor (DAP) Telemetry Drop Out and Possible Failure (Anomaly #81)

- Issues on Hiatus

  - Continuous Biaxial operations

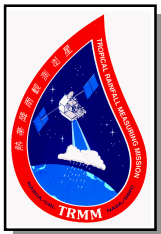  - DR on MP ground system to incorporate new CERES requirements

# VIRS Instrument

- 2 sets Solar Calibrations were performed on 00-347 (Tuesday, December 12th, 2000) and on 00-365 (Saturday, December 30th, 2000)

  – Bump Open command resolved the problem (AR#84), and door is now reaching the 100% open position.
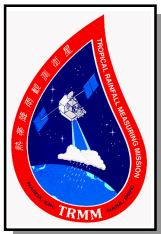
# PR / TMI Instruments

- There were no PR calibrations performed in December

- PR Open Issues

    – PR Frequency Agreement has now officially expired

        » There was no new PR interference reported by NASDA in December

    – FOT will meet with MD this week to discuss

        » Frequency Agreement Renewal status - is further pursuit still desired?

- No Open Issues with the TMI instrument

# Ground System

- The Local TPOCC Switch (LTS) BED-4 S/N 0159 (ports 13,14,15,16) experienced a power supply failure (symptom is that all the lights are on at once) on 12/23/2000 (ER #222).  H/W Maintenance replaced the BED with one that had a good power supply.

- All three strings had the quarterly GITT Security Scan performed in December.

- Work has begun in converting SOTA Bay-7 in Building 14 into a 'Test String' for new system software upgrades.  This facility would also double as a backup control center for the Building 32 MOC.

- The GMT Year Rollover occurred without incident - Hardware Maintenance saved the new year on each of the three Front End Panels (FEPs) so that a power cycle would not reset the year back to 2000.

# Upcoming Activities

- 0-2 Months

    – Ensure FOT training remains top priority

    – Award last two Spacecraft Analyst Certificates

    – Complete PSIB-Anomaly investigation and activities

    – Complete Commanded / Sensed Array Position Anomaly investigation

    – New FDF Product deliveries which will incorporate new TDRS-8 data

    – Complete the Backup Control Center failover implementation

    – Complete Linux OS Testing for the PTPs

    – Continue to close open CCRs, MOCRs, ERs, ARs, and MSR Action Items
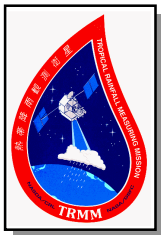
# Upcoming Activities

- 2-3 Months

  – System Software Release 9.0 Delivery; Begin testing and using the new TDRS-8

  – Begin to test, validate the new PACOR-A system

  – Commence DSN/GN FOT training

- 3-12 Months

  – Transponder Offset Activities possible

  – End Of Life Planning, Testing, and Simulations